IN THE CLAIMS:

1. (Canceled)
2. (Canceled)
3. (Canceled)
4. (Canceled)
5. (Original) An ultra-wideband (UWB) communication receiver, comprising:

a feedback amplifier having an input line and an output line, said input line electrically coupled to a common input line, wherein said feedback amplifier, said input line and said output line are configured as a feedback loop so as to loop at least once one or more transmitted pulse pairs received on said common input line, wherein said transmitted pulse pairs have a predetermined encoded data and a predetermined symbol repetition rate;

a primary delay electrically coupled to said common input line and configured to reproduce a predetermined primary lag interval D_n of said one or more transmitted pulse pairs;

one or more secondary delays electrically coupled to said common input line and configured to produce one or more non-zero lag intervals d_{nk} of said received pulse pairs,

a plurality of pulse multipliers and finite integrators designed to generate a plurality of data values indicative of a second order statistical function of said received pulse pairs resulting from said primary delay and from said one or more secondary delays,

a bank of filters to match a plurality of stored sampled values indicative of a second order statistical function of said one or more transmitted pulse pairs with said generated values indicative of a second order statistical function resulting from said primary and said one or more secondary delays of said received pulse pairs; and

a hard decision block designed to produce one or more output bits based on matching said sampled values indicative of said second order statistical function and said generated values indicative of said second order statistical function of said received pulse pairs that indicates encoded information of said transmitted pulse pairs.

6. (Original) The receiver of claim 5, wherein a gain of said feedback loop is less than 1.

7. (Original) The receiver of claim 5, wherein said feedback loop averages out interfering narrowband signals and white noise by adjusting a feedback loop travel time delay to substantially match said predetermined symbol repetition rate of said received pulse pairs.

8. (Original) The receiver of claim 5, wherein said encoding includes a relative polarity of a received transmitted data pulse with respect to a received transmitted reference pulse.

9. (Original) The receiver of claim 5, wherein said second order statistical function of said received pulse pairs includes an autocorrelation function.

10. (Original) The receiver of claim 5, wherein said second order statistical function of said received pulse pairs includes a cross-correlation function.

11. (Original) The receiver of claim 5, wherein said encoded data includes orthogonal pulses.

12. (Original) The receiver of claim 11, wherein said orthogonal pulses include a chirp waveform.

13. (Original) The receiver of claim 12, wherein said chirp waveform is different for a plurality of users.

14. (Currently Amended) The receiver of claim 13, wherein said chirp waveform increases channel capacity and decreases multiple access interference ~~MAI~~.

15. (Original) The receiver of claim 11, wherein said orthogonal pulses include a Hermite waveform.

16. (Original) The receiver of claim 11, wherein said orthogonal pulses include a wavelet waveform.

17. (Original) The receiver of claim 5, wherein said lag interval d_{nK} includes a temporal delay that can be down to about a picosecond.

18. (Original) An ultra-wideband (UWB) system, comprising:

a transmitter capable of generating one or more pulse pairs having a predetermined encoded data, a predetermined symbol repetition rate, and a primary lag interval D_n;

a receiver, further comprising,

a feedback amplifier having an input line and an output line, said input line electrically coupled to a common input line, wherein said feedback amplifier, said input line and said output line are configured as a feedback loop so as to loop at least once, one or more transmitted pulse pairs received on said common input line;

a delay electrically coupled to said common input line and configured to reproduce said primary lag interval D_n of said received one or more transmitted pulse pairs;

one or more secondary delays electrically coupled to said common input line and configured to produce one or more non-zero lag intervals d_{nk} of said received pulses,

a plurality of pulse multipliers and finite integrators designed to generate a plurality of data values indicative of an autocorrelation function of said received pulse pairs resulting from said primary delay and from said one or more secondary delays,

a bank of filters to match a plurality of stored sampled values indicative of an autocorrelation function of said one or more transmitted pulse pairs with said generated values indicative of an autocorrelation function resulting from said primary and said one or more secondary delays of said received pulse pairs; and

a hard decision block designed to produce one or more output bits based on matching said stored sampled values indicative of an autocorrelation function and said generated values indicative of an autocorrelation function of said received pulse pairs that indicates encoded information of said transmitted pulse pairs.

19. (Original) The receiver of claim 18, wherein a gain of said feedback loop is less than 1.

20. (Original) The receiver of claim 18, wherein said feedback loop averages out interfering narrowband signals and white noise by adjusting a feedback loop travel time to substantially match said predetermined symbol repetition rate of said received pulse pairs.

21. (Original) The receiver of claim 18, wherein said encoding includes a relative polarity of a received transmitted data pulse with respect to a received transmitted reference pulse.

22. (Original) The receiver of claim 18, wherein said encoding includes a relative polarity of a received transmitted data pulse with respect to a received transmitted reference pulse.

23. (Original) The receiver of claim 18, where said second order statistical values are capable of being produced by an autocorrelation function.

24. (Original) The receiver of claim 18, wherein said encoded pulses includes orthogonal pulses.

25. (Original) The receiver of claim 24, wherein said orthogonal pulses include a chirp waveform.

26. (Original) The receiver of claim 25, wherein said chirp waveform is different for a plurality of users.

27. (Original) The receiver of claim 26, wherein said chirp waveform increases channel capacity and decreases MAI.

28. (Original) The receiver of claim 24, wherein said orthogonal pulses include a Hermite waveform.

29. (Original) The receiver of claim 24, wherein said orthogonal pulses include a wavelet waveform.

30. (Original) The receiver of claim 18, wherein said lag interval d_{nK} includes a temporal delay that can be down to about a picosecond.

31. (Original) An ultra-wideband (UWB) receiver method, comprising:

receiving one or more UWB transmitted pulse pairs, each of said transmitted pulse pairs separated by a predetermined lag interval D, wherein one or more received pulse pairs have a predetermined encoded data and a predetermined symbol repetition rate;

feedback looping one or more times, a predetermined portion of said one or more received UWB pulse pairs, wherein said pulse pairs are shifted by said symbol repetition period with each iteration through a feedback loop;

delaying a predetermined portion of said received one or more UWB pulse pairs, by said lag interval D;

multiplying and integrating one or more reference signals produced by said looped pulse pairs with one or more delayed versions of encoded data comprised in said delayed one or more pulse pairs to generate a total energy that decodes said one or more received pulse pairs; and

outputting bit information indicative of encoded information of said received pulse pairs.

32. (Original) The method of claim 31, wherein a gain of said feedback loop is less than 1.

33. (Original) The method of 31, wherein said feedback loop averages out interfering narrowband signals and white noise by adjusting a feedback loop travel time to substantially match said predetermined repetition rate of said received pulse pairs.

34. (Original) The method of 31, wherein said encoding includes a relative polarity of a received transmitted data pulse with respect to a received transmitted reference pulse.

35. (Original) An ultra-wideband (UWB) method, comprising:

receiving one or more UWB transmitted pulse pairs, each of said transmitted pulse pairs separated by a predetermined primary lag interval D_n, wherein one or more received pulse pairs have a predetermined encoded data and a predetermined symbol repetition rate;

feedback looping one or more times, a predetermined portion of said one or more received UWB pulse pairs, wherein said received one or more pulse pairs are shifted by said symbol repetition period with each iteration through a feedback loop;

delaying a predetermined portion of said received one or more UWB pulse pairs, by said primary lag interval D_n;

multiplying and function of said received pulse pairs;

matching a integrating said primary and secondary delayed pulses with a predetermined looped received reference pulse to generate a plurality of values indicative of the autocorrelation plurality of stored sampled values indicative of the autocorrelation function of said transmitted pulse pairs with said generated plurality of values indicative of the autocorrelation function of said received pulse pairs; and

outputting bit information based on said matched sampled values indicative of the autocorrelation function of said transmitted pulse pairs that indicates encoded information of said transmitted pulse pairs.

36. (Original) The method of claim 35, wherein a gain of said feedback loop is less than 1.

37. (Original) The method of 35, wherein said feedback loop averages out interfering narrowband signals and white noise by adjusting a feedback loop travel time to substantially match said predetermined repetition rate of said received pulse pairs.

The method of 31, wherein said encoding includes a relative polarity of a received transmitted data pulse with respect to a received transmitted reference pulse.

38. (Original) The method of claim 35, wherein said received pulses include orthogonal pulses.

39. (Original) The method of claim 38, wherein said orthogonal pulses include a chirp waveform.

40. (Original) The method of claim 39, wherein said chirp waveform is different for a plurality of users.

41. (Original) The method of claim 40, wherein said chirp waveform increases channel capacity and decreases MAI.

42. (Original) The method of claim 38, wherein said orthogonal pulses include a Hermite waveform.

43. (Original) The method of claim 38, wherein said orthogonal pulses include a wavelet waveform.